STUDIES IN AUSTRALIAN ACARINA
TETRANYCHIDAE AND TRICHADENIDAE

By H. Womersley, South Australian Museum

[Read 11 July 1940]

The mites belonging to these two families constitute one of the most important economic problems with which the gardener, horticulturalist and fruit-grower have to contend, and at times some species may become so numerous as to be really serious pests.

Popularly they are known as "red spiders," "fruit tree mites" and "spinning mites," the last name having reference to their habit of spinning silken threads on the underside of the leaves on which they occur. It is only within recent years, due to the researches and publications of Banks, Hirst, Oudemans, MacGregor, Trägärdh, and, more recently, Geijskes, that our systematic knowledge of the different species has acquired an importance commensurate with their economic status. That their taxonomy now stands on a sound basis is due to a realization of the necessity for critical high power examination of the finer morphological characters found in the terminal segments of the palpi, the tarsal appendages, the shape of the tracheae, of the penis and the arrangement of the dorsal setae.

In Australia little, except occasional economic notes in various agricultural journals, has been written upon these acarids. In his "Synopsis of the Australian Acarina," Records Australian Museum, vol. 6, pt. 3, p. 145, 1906, Rainbow lists only the following species: *Bryobia praetiosa* Koch, *Bryobia* sp. Tryon, *Tetranychus telarius* Linn., *Tetranychus telarius* var. *cinnabarinus* Boisd., *Tetranychus cucumeris* Boisd., and *Tetranychus rosarum* Boisd. Of these species the first is recognised as a good species, but *Bryobia* sp. of Tryon, besides being unnamed, is so inadequately described as to be unrecognisable and should be ignored. At the present time all the other names are regarded as synonyms of *telarius* Linn, a species now placed in the genus *Eotetranychus*. As examination of a large amount of material from all States of the Commonwealth has failed to reveal the occurrence of *E. telarius* and shown that our common red-spider is *Tetranychus urticae* Koch *(altheae* v. Handstein), it seems probable that all early records should be regarded as the latter species.

The present paper, besides being a critical examination of Australian material, should help economic workers to recognise the precise species with which they are called upon to deal. It would, however, have been impossible to present such a survey as this without the very generous assistance of the Division of Economic Entomology, Canberra, and of the various Departments of Agriculture of the different States. To the heads of all these bodies I extend my sincere thanks.

Family TETRANYCHIDAE

The following key lists the known genera of Tetranychidae and the known Australian species.

1 Maxillary palpi slender, with or without tibial claw. Leg-segments usually wrinkled and legs short to much shorter than body. 2

Maxillary palpi stout, with distinct tibial claw. Legs of normal length, little if at all shorter than body, or else excessively long. Leg-segments not wrinkled. 6

2 Palpi short but slender, without tibial claw. 3

Palpi longer, with distinct tibial claw. Ornate species with fan-shaped setae. Empodium as a pair of claw-like processes thinner than the true claws. Legs short.

Genus **Tuckerella** nov.
ornatus Tucker

3 Mouth-parts completely hidden from above under propodosoma. Palpi 2-segmented, last segment and apex of tarsi I and II with a stout cylindrical rod-like seta. Legs very short.

Genus **Tegopalpus** nov.,
conicus n. sp.

Mouth-parts not so hidden. 4

4 Palpi and hypostome fused together; palpi 1-segmented (or perhaps 2-segmented). Legs short and thick. Lives in galls.

Genus *Phytoptipalpus* Trägärdh
(not Australian)

Palpi and other mouth-parts normal. 5

5 Eyes distinct, 2 on each side. Leg-segments very much wrinkled and femora much constricted at base, then suddenly widening. Tarsi with 2 claws, with 2 or more tenent hairs; empodium with two series of tenent hairs.

Genus *Tenuipalpus* Donnadieu
phoenicis Geijskes
californicus Banks
vitis n. sp.

Eyes indistinct or absent. Leg-segments normal; tarsi with 2 simple claws and a ciliated pad-like empodium.

Genus *Tetranychoides* Banks
(not Australian)

6 Empodium vestigial, connate at base dorsally to tarsus forming a mere protuberance. Claws forming two pairs of tenent hairs and arising dorsally from tarsus, not apically.

Genus *Anychus* MacGregor
(not Australian)

Both empodium and claws well developed, modified or not, and attached to tarsus apically. 7

7 Claws normal, unmodified, with or without a pair of lateral tenent hairs. Empodium not claw-like. 8

Claws modified so as to form a lobe or pad ending in two tenent hairs. Empodium more or less claw-like, with or without a double series of tenent hairs. 11

8 Front of propodosoma 4-lobed, each lobe tipped with a scale-like seta. Dorsal setae also scale-like. Peritreme produced as a sausage-like chamber on each side of gnathosoma. Legs not excessively long, except I, which in female is rather longer than body and in male quite twice as long. Claws with a pair of lateral tenent hairs.

Genus *Bryobia* Koch
praetiosa Koch

Front of propodosoma not as above. 9

9 Tarsi distinctly or very much shorter than tibiae. At least legs I and IV longer than body. 10

Tarsi about as long as tibiae. Legs slightly shorter than body. Dorsal setae long, strongly ciliated and arising from strong papillae. Peritreme produced on each side of gnathosoma as a tube- or sausage-like chamber.

Genus *Tetranychopsis* Canestrini
(not Australian)

10 Tarsi very much shorter than tibiae. All legs excessively long. Peritreme not produced. Dorsal setae strong, curved, spine-like, but not arising from papillae. Claws without lateral tenent hairs. Genus *Neophyllobius* Berlese
ornatus n. sp

Tarsi about three-fourths length of tibiae. Leg I longer than body, IV only slightly so. Peritreme produced on each side of gnathosoma. Dorsal setae normal and relatively short. Genus *Tetranobia* Banks
(not Australian)

11 Front and hind legs excessively long, 2-3 times as long as body. Apex of peritreme slightly produced as a small round compound chamber. Empodium with two series of numerous tenent hairs. Dorsal setae long, stout, blunt ended, ciliated and arising from strong papillae. Genus **Tenuicrus** nov.
errabundus n. sp.

No legs excessively long, only I, if any, but little longer than body. 12

12 Peritreme produced apically as a tube or a large globular swelling. 13

Peritreme not produced. 15

13 Peritreme produced as a large globular swelling or chamber. Empodium claw-like with a single tenent hair on each side. Dorsal setae long, slender and ciliated, but not arising from papillae. Genus **Schizonobia** nov.
sycophanta n. sp.

Peritreme produced sausage-like. 14

14 Dorsal setae very strong and spine-like, with ciliations and arising from strong papillae. Empodium claw-like with double series of numerous tenent hairs.
Genus **Aplonobia** nov.
oxalis n. sp.

Dorsal setae less strong or spine-like, not on papillae. Empodium as above.
Genus *Petrobia* Murray
latens O. F. Müll.

15 Dorsum not strongly convex. Dorsal setae thin, finely ciliated and not arising from papillae. 16

Dorsum strongly convex, setae strongly ciliated and arising from warts or papillae. 24

16 Seven transverse rows of dorsal setae: 2 . 4 . 4 (6) . 4 . 4 . 4 . 2, *i.e.*, "setae clunales" present. 17

Six transverse rows of dorsal setae: 2 . 4 . 4 (6) . 4 . 4 . 4, *i.e.*, "setae clunales" absent. 23

17 Peritreme short, straight, with swollen end-chamber. Empodium claw-like, not split into six needles but ventrally with or without a proximal basal process. 18

Peritreme long, V-shaped, with 2 or more chambers. 20

18 Empodium Y-shaped, no ventral basal process.
Genus *Schizotetranychus* Trägärdh
(not Australian)

Empodium a simple claw with ventral basal process. 19

19 Ventral basal process of empodium with 2 reflexed and haired appendages. Legs short and thickly haired.
Genus *Oligonychus* Berl.
(not Australian)

Ventral basal process of empodium consisting of 6 straight downward directed needles.
Genus *Eurytetranychus* Oud.
(not Australian)

20 Empodium without basal ventral process. 21

Empodium claw-like, with basal ventral process of 4-6 needles; claw of empodium shorter than needles.
Genus *Septanychus* MacGregor
(not Australian)

21 Empodium a simple claw. Peritreme ∧-shaped, arms of equal width, apex slightly swollen.
Genus **Anatetranychus** nov.
hakea n. sp.

Empodium bent downwards and split into 4-6 needles. 22

22 Dorsal setat long and fine ,with normal basal ring. Genus *Eotetranychus* Oud. (not Australian)

Dorsal setae spindle-like, with roots in a spherical cavity. Genus *Apotetranychus* Oud. (not Australian)

23 Apex of peritreme simple. The dorsal striations forming a rhombic field between the inner setae of the fifth and sixth transverse rows (lumbales and sacrales).
Genus *Tetranychus* Dufour
urticae Koch

Apex of peritreme complex and anastomosed. Dorsal striations not showing above rhombic field.
Genus *Amphitetranychus* Oud. (not Australian)

24 Peritreme short and straight with swollen apical chamber. Empodium claw-like with ventral basal process of needles.
Genus *Paratetranychus* Zacker
ununguis Jacobi

Peritreme long, V-shaped and many chambered. Empodium split into 4-6 needles, without ventral basal process. 25

25 Seven transverse rows of dorsal setae: 2 . 4 . 4 (6) . 4 . 4 . 4 . 2., *i.e.*, "setae clunales" present. 26

Six transverse rows of dorsal setae: 2 . 4 . 4 (6) . 4 . 4 . 4, *i.e.*, "setae clunales" absent. Tarsus of palp with terminal club. Dorsal setae shorter than distance between transverse rows.
Genus *Platytetranychus* Oud. (not Australian)

26 Peritreme short, straight, with swollen apical chamber. Empodium with basal ventral process of six needles.
Genus *Metatetranychus* Oud.
ulmi Koch = *pilosus* Can. et F.

Peritreme long, V-shaped, swollen at bend and distal arm the wider. Empodium simple, claw-like, without ventral basal process.
Genus *Neotetranychus* Trägärdh
hakea n. sp.

Genus Tenuipalpus Donnadieu 1875

Tenuipalpus Donnadieu, 1875: Recherches pour servir à l'histoire de Tetranyques. Diss. Lyon, p. 111.

Brevipalpus idem, ibid., p. 115.

Minute reddish mites with oval or egg-shaped body or with the opisthosoma strongly contracted behind coxae IV and rectangular. Dorsal and ventral surfaces often reticulated. Setae generally small, variable in form, simple to leaf-like. Legs short and thick, femora strongly constricted at base then suddenly widening, segments strongly wrinkled. Claws 2, with tenent hairs; empodium not claw-like, modified, with two series of tenent hairs. End of tarsus truncate, apex ventrally with two broadened and laterally serrate setae, dorsally with a long hair. Tarsus I and II with a sensory seta. Palpi long and slender, without tibial claw, apically with 1-2 long hairs. Front margin of propodosoma somewhat overlapping base of gnathosoma, mostly pointed at apex.

These mites infest a great variety of plants, both in glass-houses and out of doors. Although generally not supposed to spin silk to any appreciable extent, yet one species in Australia is responsible for the webbing together of grape vines.

Approximately twenty species appear to have been described but the three following only are as yet known from Australia. The South African species *Tenuipalpus ornatus* Tucker also occurs here, but as this species does not fit into the genus *Tenuipalpus* s. str. it is in this paper removed to a new genus, *Tuckerella*.

TENUIPALPUS PHOENICIS Geijskes 1939

Meded. Landbouwhoogeschool, Wageningen, **42**, (4), 1939.

This species had only recently been described as infecting date-palms in Holland. It was, however, regarded as an introduction, for it was stated that the country of origin was unknown.

It may seem, therefore, somewhat dubious to relate the following Australian material to the above species, but as will be seen from the figures given, there is complete agreement with those given by Geijskes. In Australia the species appears to occur on a variety of hosts, and is undoubtedly an economic one.

Description—Colour in life, red. Female length, 250 μ, width 148 μ (the dimensions given by Geijskes are somewhat greater, *viz.*, 0·284 mm. by 0·151 mm.). Body egg-shaped, the widest part on a level with the dorsal suture between the propodosoma and the hysterosoma, thereafter tapering and rounded apically. Dorsal suture distinct, anterior and posterior dorsal shields strongly reticulated. Anterior margin of propodosoma as figured, overlapping base of gnathosoma. Propodosoma with three pairs of setae arranged around the margin; hysterosoma with 18 setae arranged in three transverse rows of four, then six setae around the margin; all these setae are short, narrow, leaf-like, serrated and slightly curved as figured, none of the apical setae overreach the edge of the hysterosoma. Mouthparts: mandibles styliform, palpi 3-segmented, without tibial-claw, apical segment with several straight setae.

Ventral surface, as shown, strongly reticulated, coxae I with two setae, II-IV with one seta each; anterior shield three-sided, median shield with two pairs of setae, anterior pair short, posterior pair three to four times length of anterior pair, posterior part of hysterosoma with two shields, anterior quadrate with a pair of short posterior setae, posterior shield rounded with three indeterminate angles, as wide as anterior shield and with four short setae. Legs moderately long, IV somewhat over-reaching apex of abdomen; femora of I and II dorsally with a stout seta which, upon high magnification, is similar to dorsal setae. Tarsi with paired claws, each carrying two to four lateral tenent hairs, empodium with paired pads carrying series of tenent hairs; tarsi dorsally with a long seta. Eyes, two on each side.

The Australian material does not appear to differ from Geijskes' species, although while he figures and states that the dorsal seta of femora I and II is stout and rod-like, high magnification shows it as somewhat serrate. This is a common species on a wide variety of plants in Australia. The members of the genus have generally been regarded as free-living, non silk-spinning forms, but

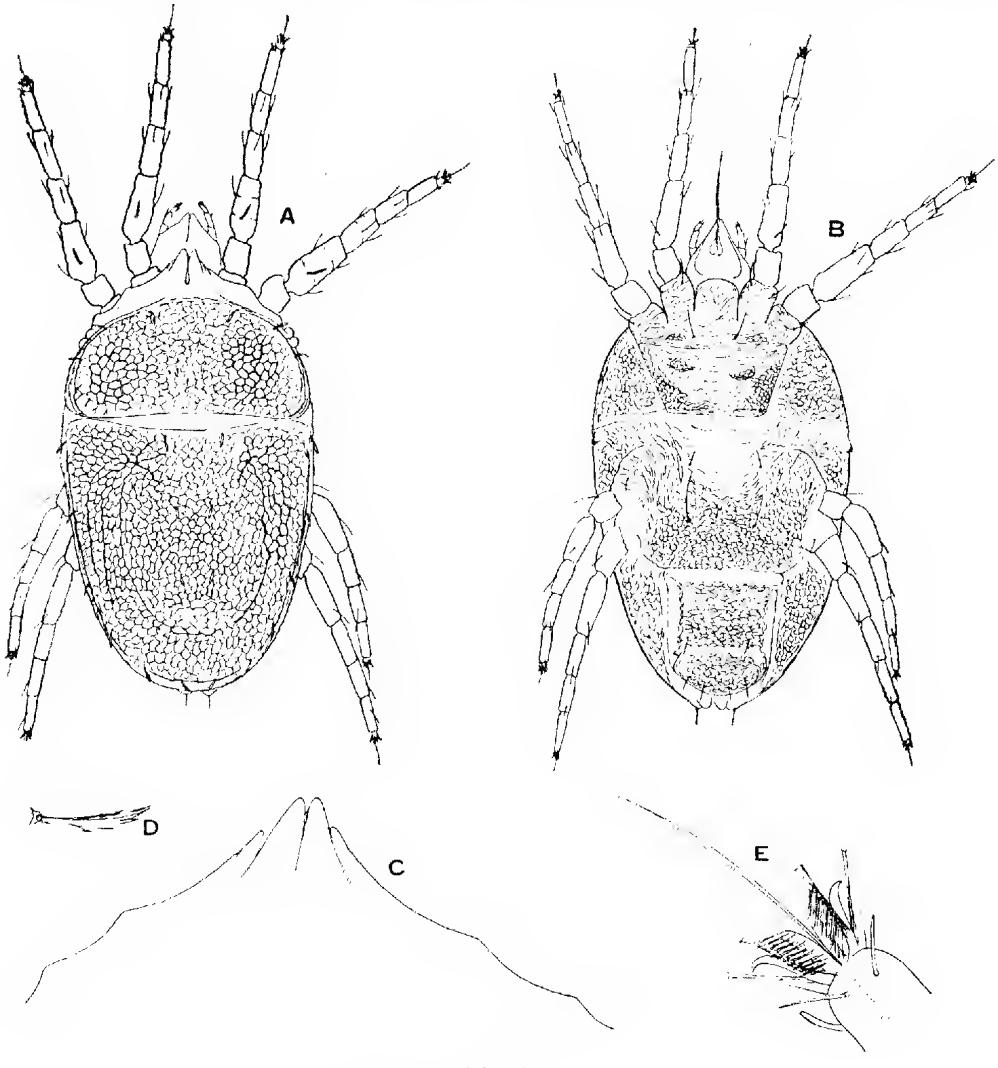

Fig. 1
Tenuipalpus phoenicis Geijskes
A, dorsal view; B, ventral view; C, front of propodosoma;
D, dorsal seta; E, tip of tarsus

on two occasions this species has been found to cause considerable webbing of grapes and vine-leaves.

N.B.—All figures, unless specified, refer to the females

Localities and Hosts:

South Australia: on sage, Adelaide, February 1940, (H. W.); webbing grapes and vine leaves, Waikerie, 5 April 1940, (D. C. S.).

Victoria: webbing grapes, Swan Hill, 5 March 1940 (R. T. M. P.); on citrus, Burnley, 13 August 1936 (R. T. M. P.).

Western Australia: on lemons, Spearwood, July 1935 (L. J. N.); on banana fruit, Carnarvon, 9 January 1939 (L. J. N.).

Queensland: on passion-fruit, Rockhampton, 1939 (A. R. B.).

New South Wales: on big-leaved Privet, Sydney, 3 September 1934; on Camelia bud, Sydney, 16 May 1939; on *Vitis clematidea,* Avalon, 15 July 1934; on *Clematis,* Parramatta, 3 September 1934; on *Hibbertia volubilis,* Avalon Beach, 15 July 1934; on Privet, Mosman, 8 August 1934; on *Clematis,* Cabramatta, 3 September 1934.

Northern Territory: on *Datura* leaves from Darwin, 15 April 1940.

Probably the same species is that recorded in the "Agricultural Gazette of New South Wales," vol. 45, 1934, p. 386, as damaging grapes by webbing in the Hunter River, Liverpool and Griffiths districts.

Tenuipalpus californicus Banks 1904

Journ. New York Entom. Soc., 1904, p. 55.

There seems little doubt that the material before me can be correctly referred to the above species. The following description and the figures, however, are from Australian material.

Description—Female, length 190 μ, width 135 μ. Body: propodosoma + metapodosoma rounded, opisthosoma much narrowed by a comparatively sharp constriction behind fourth pair of legs, then somewhat rectangular and almost quadrate but rounded apically. Dorsal suture indistinct, but a series of irregular lines on the level of legs IV divides the body into two distinct shields corresponding to the propodosoma + metapodosoma and the hysterosoma. Neither dorsum nor venter reticulated or patterned. Propodosoma + metapodosoma with three pairs of setae (fig. 2, A) arranged around the margin and two pairs of similar median but much shorter setae and two simple setae; opisthosoma with eight marginal setae (fig. 2, A), one pair just posterior of leg IV and three pairs at equidistances around the apical margin, and one pair of anterior fine small setae; there is also another pair of marginal setae between legs III and IV; the longer setae are moderately broad, leaf-like and serrate as in fig. 2 C and 13·5 μ long, The three pairs of apical setae overreach the body margin. Mouth parts, palpi and mandibles as in the genus. Eyes, two on each side.

Ventral surface: coxae each with a single small fine seta; just posterior of and between coxae I is a pair of long fine setae and there is a similar pair between coxae IV; medially in the field between coxae II and III is a pair of fine short setae. On each side of the anal opening are three very small fine setae, and anterior of it, but further apart, is another pair. Legs very short, IV not reaching apex

of body; claws and empodium as in the genus; femora I and II showing but little contraction at base and femora II without an apophysis.

My specimens differ from Banks' figure as given by Quayle (1912) in several details, but one assumes that his figures were not drawn under sufficiently high magnification. No dorsal setae, apart from the six apical marginal ones are shown by Quayle, and he only figures a single eye on each side. More important perhaps is his figure of the tarsus, where he shows four similar claws, instead of two claws and a median empodium. Such a structure does not appear to have been figured for any other species.

It was described from California as infesting lemons, but occurs in Australia on a variety of hosts and has been taken quite frequently, but not always, along

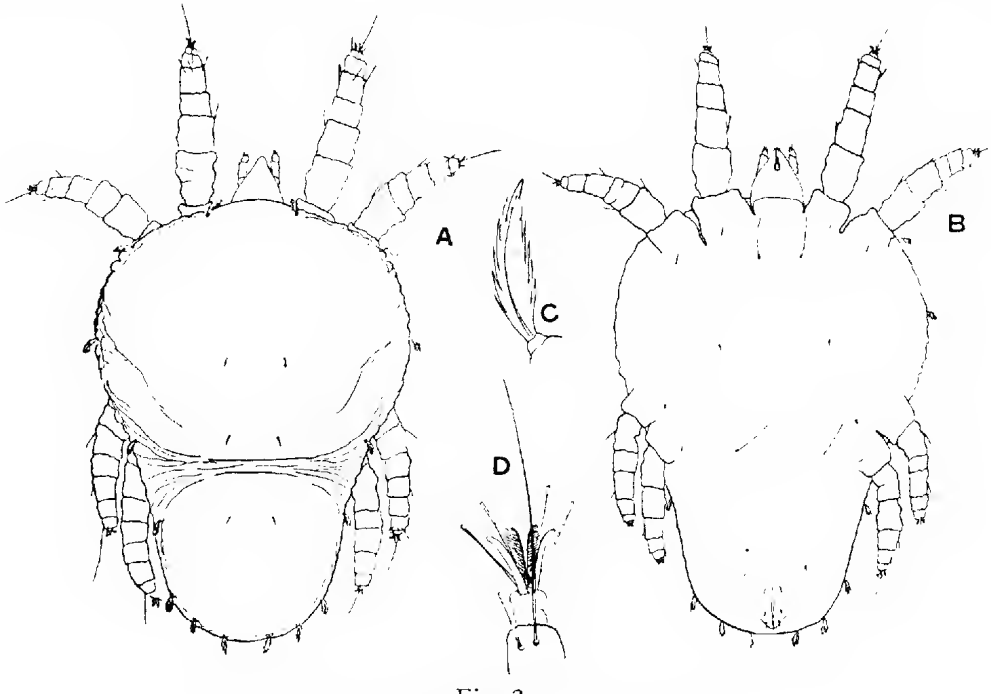

Fig. 2
Tenuipalpus californicus Banks
A, dorsal view; B, ventral view; C, dorsal seta; D, tip of tarsus II from above

with the preceding. It does not appear, however, from the relative numbers examined to be as common.

Localities and Hosts:

South Australia: on Fuchsia in green-house, Botanic Gardens, Adelaide, 26 February 1940 (H. W.).

New South Wales: on Big-leaved Privet, Sydney, 5 July 1934; on Camellia bud, Sydney, 16 May 1939; on *Vitis clematidea*, Avalon, 15 July 1934; on *Clematis*, Cabramatta, 3 September 1934; on *Hibbertia volubilis*, Avalon Beach, 15 July 1934.

Victoria: on grapes, Swan Hill, 5 March 1940 (R. T. M. P.); on citrus, Burnley, 13 May 1936 (R. T. M. P.).

Northern Territory: on *Datura* leaves from Darwin, 15 April 1940.

Tenuipalpus vitis n. sp.

The following species does not agree with any previous description that I am aware of. It is closely related to the preceding but differs in a number of important details as well as in size.

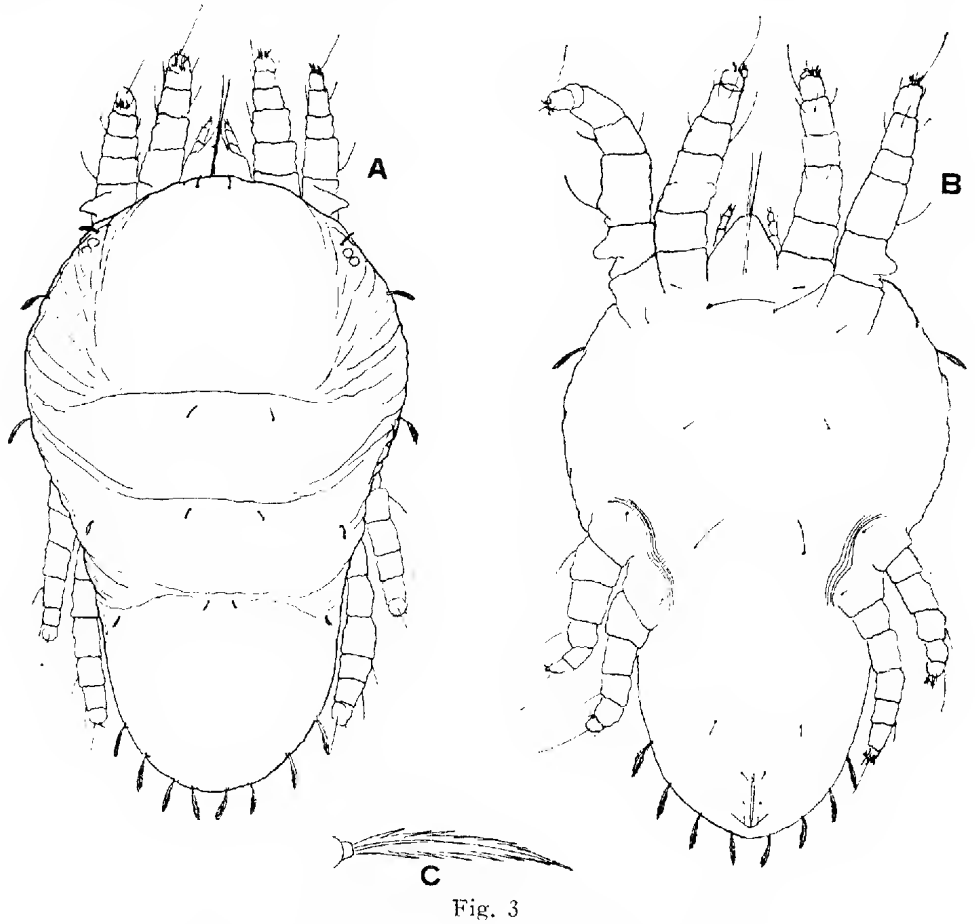

Fig. 3
Tenuipalpus vitis n. sp.
A, dorsal view; B, ventral view; C, apical dorsal seta

Description—Female, length 248 μ, width 140 μ, shape much as in preceding species, but propodosoma + metapodosoma rather longer than wide and with an indistinct suture between; posteriorly the body is constricted from leg IV, somewhat rectangular and rounded apically; there are indistinct transverse sutures or lines on level of leg III and just posterior of leg IV. Neither dorsally nor

ventrally are there reticulations or patterning. Eyes, two on each side. Mouth parts, palpi, etc., as in the genus.

On the propodosoma there are three pairs of marginal setae, the anterior pair being very small, the second pair larger and the posterior pair the largest; on the metapodosoma are two pairs of lateral setae, the anterior large, the posterior smaller, medially are two pairs of smaller and (?) fine setae; on the opisthosoma anteriorly are a pair of small lateral setae and a pair of median smaller (?) fine setae; around the apical margin are four pairs of equidistant long narrow serrated, leaf-like setae (fig. 3, C) 16·2 μ long. Ventrally the setae are as in the preceding species. Legs strong and short as in the genus, but with little or no constriction at the base of the femora I and II, femora II with a pronounced lateral triangular apophysis. Claws and empodium as in the genus.

This species differs from the preceding in the size and shape and in the lengths and arrangements of the dorsal setae, as well as in the apophysis on femora II.

Locality and Host:

Western Australia: on lemons, Perth, May 1934 (L. J. N.).

Genus **Tegopalpus** nov.

Description—Elongate-oval in form with the mouth-parts hidden under the propodosoma. Palpi 2-segmented without tibial claw, tarsus with a long seta and a stout cylindrical appendage. Legs very short, tarsi of I and II with a stout cylindrical seta. Claws normal with a pair of lateral tenent hairs, empodium split to form a pair of fine, somewhat slender claw-like processes.

Tegopalpus conicus n. sp.

Description — Sex ?, probably female. Shape an elongate oval, greatest width just before the middle; length 324 μ, width 162 μ. Eyes, two on each side. Dorsal and ventral surfaces not reticulated, but finely striated. Indistinct sutures present between propodosoma and metapodosoma and between metapodosoma and opisthosoma. Mouth-parts hidden beneath propodosoma; mandibles styliform, palpi only 2-segmented without tibial claw, apical segment small and rounded with a long seta and a long, stout, cylindrical seta. Legs very short, tarsi I and II with a similar cylindrical seta to that of palpi; claws simple but with a pair of lateral tenent hairs, empodium divided into two fine prongs which are somewhat claw-like. Dorsal setae: on propodosoma three pairs of lateral serrated leaf-like setae, on metapodosoma two pairs of similar setae laterally, a median similar pair anteriorly, and a pair of median fine and small setae posteriorly, opisthosoma with four pairs of lateral leaf-like setae, and an anterior pair of small fine ones. Ventral setae: coxae each with a small fine seta, between legs II and legs IV and in field between legs II and III a pair of long fine setae, on each side of anus are four small fine setae.

This very interesting and rather aberrant species is only known from four specimens from New South Wales collected on *Casuarina* at Avalon Beach on 26 August 1934 and submitted by the Department of Agriculture. In the structure of the claws and empodium it is related to the next genus.

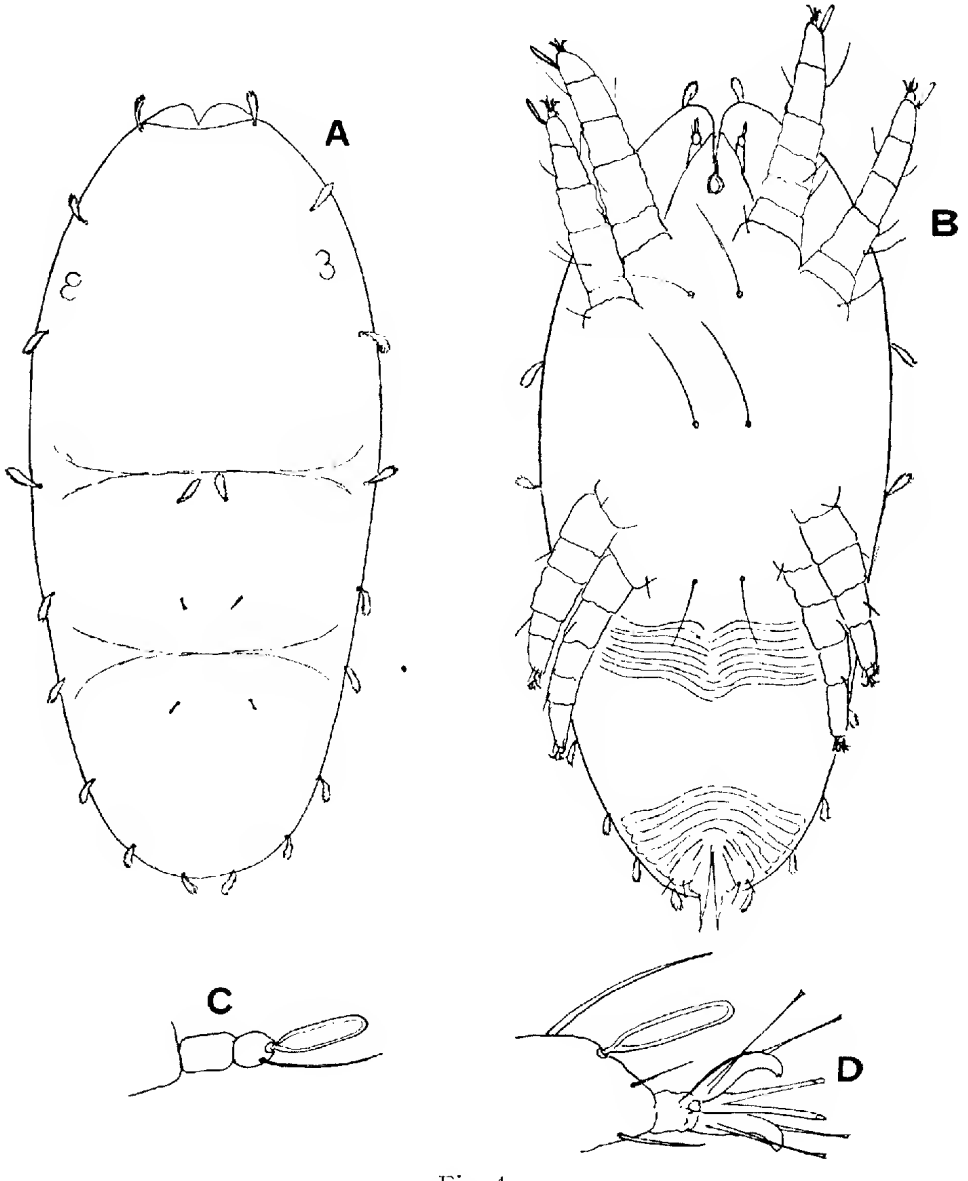

Fig. 4
Tegopalpus conicus g., et sp. n.
A, dorsal view; B, ventral view; C, palp; D, tip of tarsus I

Genus **Tuckerella** nov.

This genus is erected for the species *Tenuipalpus ornatus* described by Tucker from South Africa. It differs from *Tenuipalpus* as in the key to genera and the following generic description.

Description—Elongate-oval in shape. Eyes, two on each side. Mouth-parts elongate, mandibles not so styliform as in *Tenuipalpus*. Palpi long, 4-segmented, tibia with a strong claw, tarsus over-reaching slightly tip of claw, cylindrical with four long pointed setae and a cylindrical rod. Claws normal and strong with paired lateral tenent hairs and the empodium split into two fine processes resembling claws. Dorsum divided into propodosoma, metapodosoma and opisthosoma, reticulated and furnished with fan-like setae and apically with a bunch of long ciliated setae. Legs short.

Tuckerella ornata (Tucker 1926)

Tenuipalpus ornatus Tucker, Dept. of Agric., S. Afr., Memoir, No. v, 1926, p. 4, pl. ii.

Description—Female, length to front of propodosoma 337 μ, gnathosoma 135 μ, width 216 μ. Colour in life, red. Body roundish-oval, widest on line of propodosomal-metapodosomal suture. Dorsum strongly reticulated with sutures indistinctly shown between propodosoma and metapodosoma and between metapodosoma and opisthosoma. Mouth-parts elongate, mandible piercing, stylet-like, palpi elongate, 4-segmented, tibia with well-developed claw, tarsus cylindrical, slightly over-reaching tip of claw and furnished with four setae and one cylindrical rod. Eyes, two on each side. Dorsum furnished with over 40 large, fan-shaped setae, propodosoma with two anterior-marginal, two postero-lateral and four submarginal, metapodosoma with an anterior row of eight, a subposterior row of six and four lateral on each side; opisthosoma with six marginal and eight smaller dorsal setae; at the apex of the opisthosoma is a tuft of 10-12 long ciliated setae; the largest dorsal setae are 54 μ long and the apical ciliated setae 350 μ long (in the figures these setae have been abbreviated). Legs short, IV not reaching apex of body, furnished with similar but smaller fan-like setae; claws strong, furnished with a pair of lateral tenent hairs; empodium divided into two processes, resembling but more slender than the claws. Ventral setae: coxae each with one slender fine seta, between coxae I, coxae IV and in field between coxae II and III a pair of fine setae, those between coxae I the longest.

Remarks:

In the presence of the palpal claw and the pronounced mouth-parts this species obviously cannot fit into *Tenuipalpus*. The mandibles and tarsal claws and empodium will also exclude it.

There seems little doubt that it is the same as that described by Tucker (1926) as infesting citrus fruits in South Africa, and it was quite recognisably figured by Froggatt from galls on Privet at Sydney, New South Wales, in the Agricultural Gazette of New South Wales for 2 September 1916. It was,

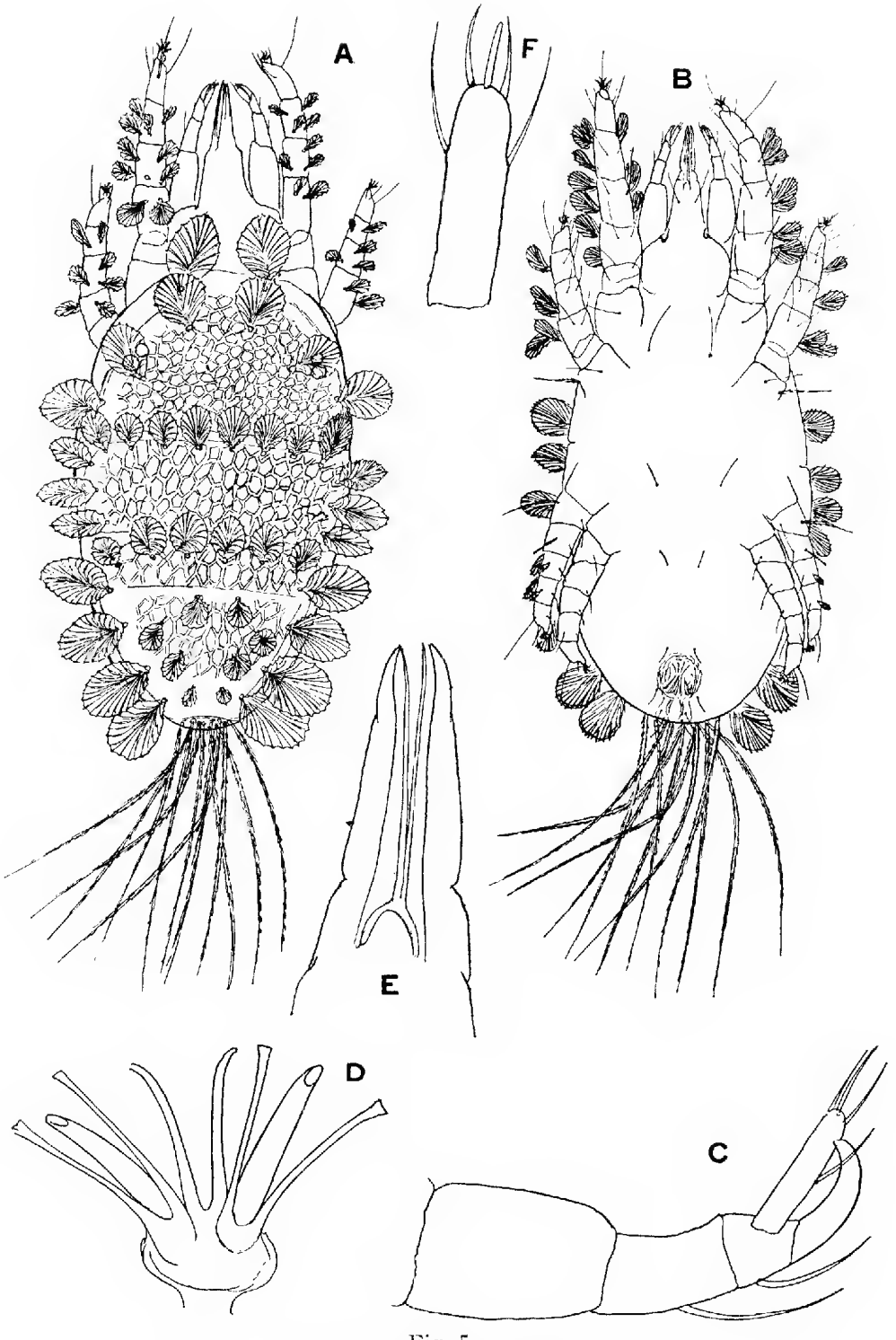

Fig. 5

Tuckerella ornatus (Tucker)

A, dorsal view; B, ventral view (terminal abdominal setae abbreviated); C, palp; D, claws and empodium; E, mandibles; F, tip of palpal tarsus

however, mistakenly regarded by him as the gall-maker and referred to the Oribatidae and near to *Leiosoma* Nicolet.

Localities and Hosts:

New South Wales: on Privet, Sydney, October 1916 (W. W. Froggatt); Mosman, 7 August 1934; on Cypress Pine, Castle Hill, 23 August 1934; on *Apiomorpha* gall on Eucalypt, Boomi, 16 August 1934.

Genus Bryobia Koch 1836

Bryobia Koch, 1836: Deutsch Crust. Myr. Arachn., f. I, t. 8-9.

Body flat, broad and oval in female, egg-shaped in male. Cuticle irregularly wrinkled and with small tubercles. Front margin of propodosoma 4-lobed, each lobe tipped with a seta. Body setae fan-like, apically over-reaching edge of body. Front legs longer than the rest and slightly longer than body in female, much more so in male. Tarsi about as long as tibiae. Claws normal with lateral tenent hairs, empodium with two series of tenent hairs. Palpi stout with tibial claw. Mandibles styliform, with distinct mandibular plate. Peritreme opening externally in a pair of sausage-shaped processes. Eyes, two on each side, the anterior smaller than posterior.

Bryobia praetiosa Koch 1836

Bryobia praetiosa Koch 1836: Deutsch. Crust. Myr, Arachn., f. I, t. 8-9.

Description—Female, length to 700 μ, width 500 μ; male, length 460 μ, width 320 μ. Colour in life reddish with grey or greenish-grey to black body, gnathosoma and legs red. Front of propodosoma with four lobes, the median pair the longer, and each tipped with a leaf-like seta. Body oval, broad and flat in female, more elongate and egg-shaped in male. A distinct sutural line between proterosoma and hysterosoma. Eyes, two on each side, the anterior the smaller. The proterosoma with a pair of setae just medial to the eyes. Hysterosoma with an anterior row of six setae, two pairs in middle and 14 setae situated around the margins; all these dorsal setae are leaf-like. The arrangement of setae in the male is similar, but there seems to be an additional pair of lateral setae posteriorly on the proterosoma. Ventrally the setae are long and fine, there are two on coxae I and one on coxae II-IV; between coxae II, coxae IV and in field between coxae II and III and posterior of coxae IV is a pair, and there are several small ones around the anus. The mandibles are styliform, with a distinct mandibular plate, slightly incised at apex. Tracheal tubes opening externally on each side of mandibular plate as sausage-like processes. Palpi stout with distinct tibial claw. Legs I in female about as long as body, others shorter; in male I about twice as long as body, 665 μ. Claws with lateral tenent hairs, empodium with two series of tenent hairs; leg setae fine and ciliated. Penis long and slender, slightly curved.

Remarks:

This species, frequently known as the "clover mite," is of almost cosmopolitan distribution. It is a frequent pest of apple and other fruit trees, the

young stems of which are often decidedly red in colour due to the covering of eggs of the mite.

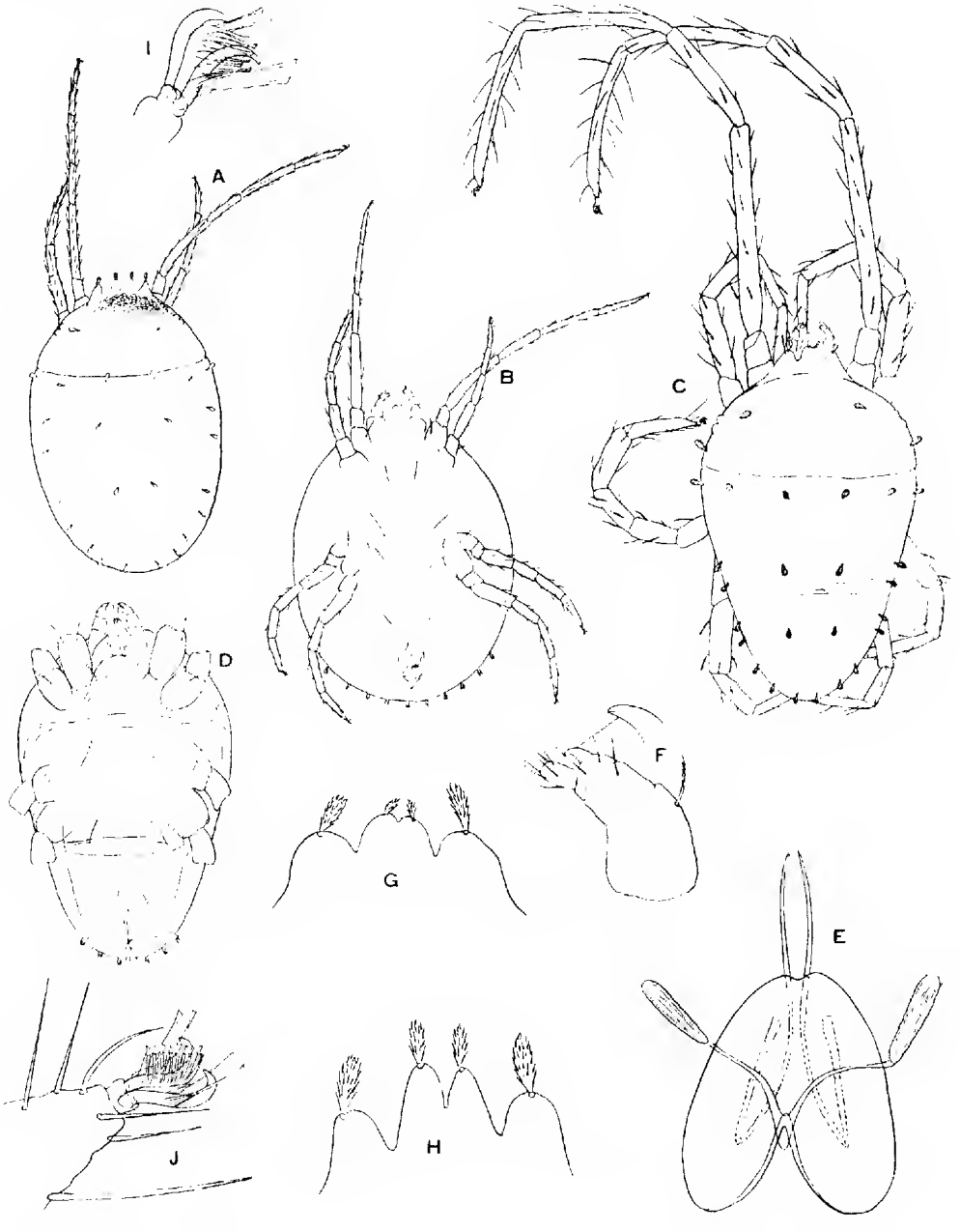

Fig. 6

Bryobia practiosa Koch

A, dorsal view of female without posterior legs; B, female, ventral view; C, dorsal view of male; D, ventral view of male; E, mandibles and peritreme; F, palp; G, front of propodosoma of male; H, same of female; I, lateral view of claws and empodium of leg I; J, same of legs II-IV

It has gone under a number of synonyms and it seems probable that most, if not all the different species of *Bryobia* described are but one and the same species.

Localities and Hosts:

South Australia: on *Lolium perenne* in glasshouse, Waite Institute, Glen Osmond, 5 October 1933 (D. C. S.); on apple foliage, Waite Institute, 30 October 1932 (D. C. S.); on rye grass and clover, Waite Institute, 9 November 1933 (D. C. S.); Glen Osmond, July 1934 (R. V. S.); Brown Hill Creek, 6 August 1933 (H. W.).

Western Australia: on almonds, Perth, 16 January 1939 (P. N. F.); on apples, Mount Barker, 29 September 1932; Karrogullen, 9 March 1940 (C. F. H. J.); Narrogin, 20 October 1938 (K. R. N.); in grass, Crawley, 27 June 1935 (K. R. N.).

Victoria: Mildura, 24 February 1939; Beechworth, 23 August 1939; Frankston, 23 February 1939; Wantirna, 23 February 1929; Bendigo, 23 February 1939; Geelong, 23 February 1939; Warragul, 25 February 1939; Amphitheatre, 27 February 1939; Heidelberg, 23 February 1939.

New South Wales: Bathurst, June 1932; on *Amaranthus*, Sydney, 14 June 1934.

Genus NEOPHYLLOBIUS Berlese 1886

Neophyllobius Berlese 1886: Acari dannosi alle piante coltivate, p. 19.

Description—Body roundish oval, without sutural line between proterosoma and hysterosoma. Dorsal setae strong, curved, often on small tubercles. Palpal tibia without claw, with two setae and an apical stout curved rod. Legs very long, all much longer than body, especially I and IV, genu of III and IV often with a long whip-like seta; tarsi very much shorter than tibiae; claws normal, without tenent hairs, empodium with two series of tenent hairs. Eyes, two on each side.

This genus is found in Europe (four species), in North America (two species), and now a further species is described from Australia. They are small reddish mites occurring under stones, in moss, etc.

Neophyllobius ornatus n. sp.

Description—Female (?), body rounded, length 250 μ, width 175 μ. Colour in life reddish. Dorsum without suture. Eyes, two on each side. Mandibles styliform, palpi short but slender, 4-segmented, tibia without claw but with two setae and a long curved stout rod, tarsus short and rounded with four setae. Dorsal setae 54 μ, on small papillae, ciliated, coarse, curved, and pointed, arranged in transverse rows of 4 . 4 . 4 . 4 . 4 . 4 . 2, *i.e.*, mid-dorsally with seven pairs. Ventral setae long and fine, one on each coxa, one pair between coxae I and another between coxae III and a pair on the gnathosoma; legs very long, longer than body; genu of all legs with a long whip-like seta, finely ciliated, tarsi shorter

than tibiae; claws simple without tenent hairs, empodium with two series of tenent hairs. Length of leg I 445 μ, II 391 μ, III 391 μ, IV 432 μ; of genual seta I 148 μ, II 148 μ, III 175 μ, IV 175 μ; tarsi somewhat swollen.

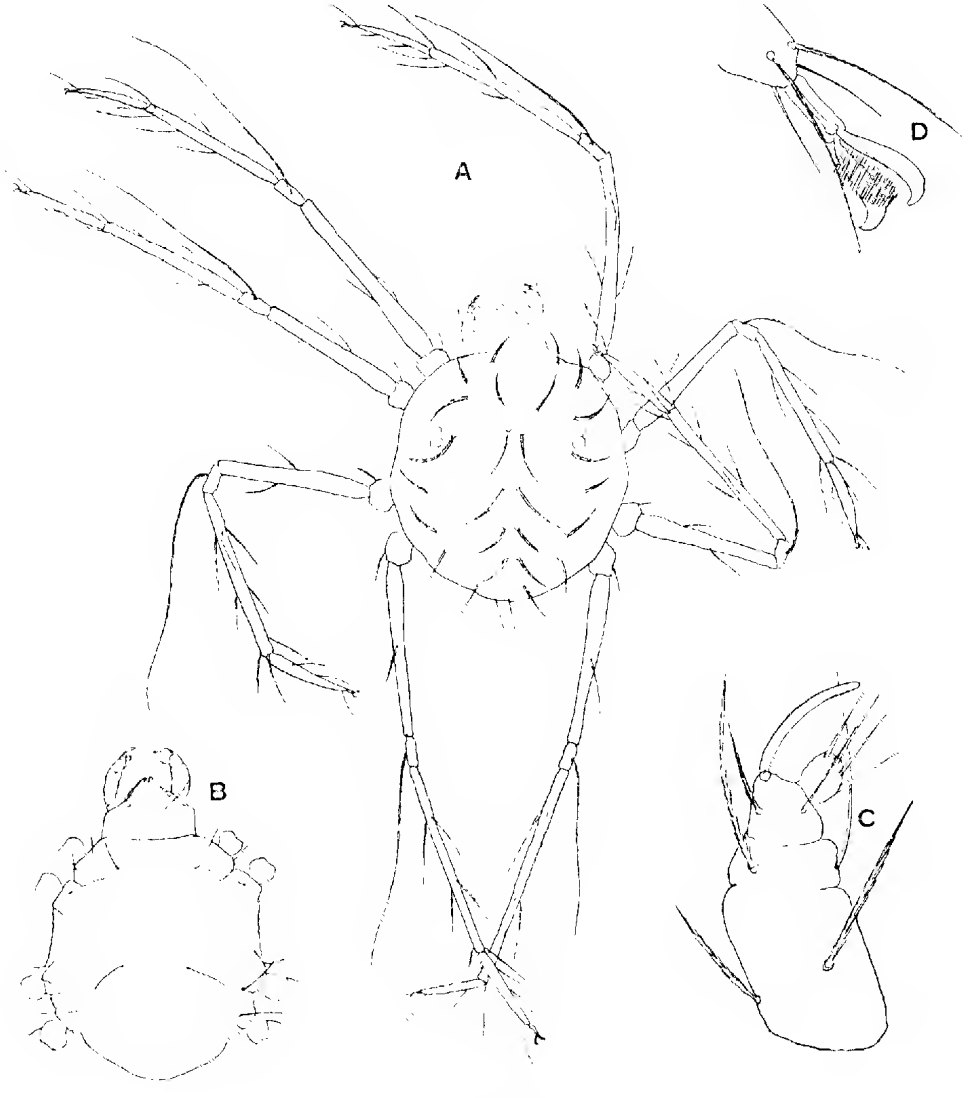

Fig. 7
Neophyllobius ornatus n. sp.
A, dorsal view; B, ventral view; C, palp; D, claws and empodium

Remarks:

This new species differs from all others in the arrangement and number of dorsal setae. It is closest to *saxatilis* Halbert, but differs in the nature of the dorsal setae. No species is known to be of economic importance.

Locality:

On *Apiomorpha* gall on *Eucalyptus,* Boomi, New South Wales, 16 August 1934.

Genus **Tenuicrus** nov.

Description—Roundish oval forms. Dorsum irregularly striated, furnished with long, thick, blunt, ciliated and almost straight setae arising from strong

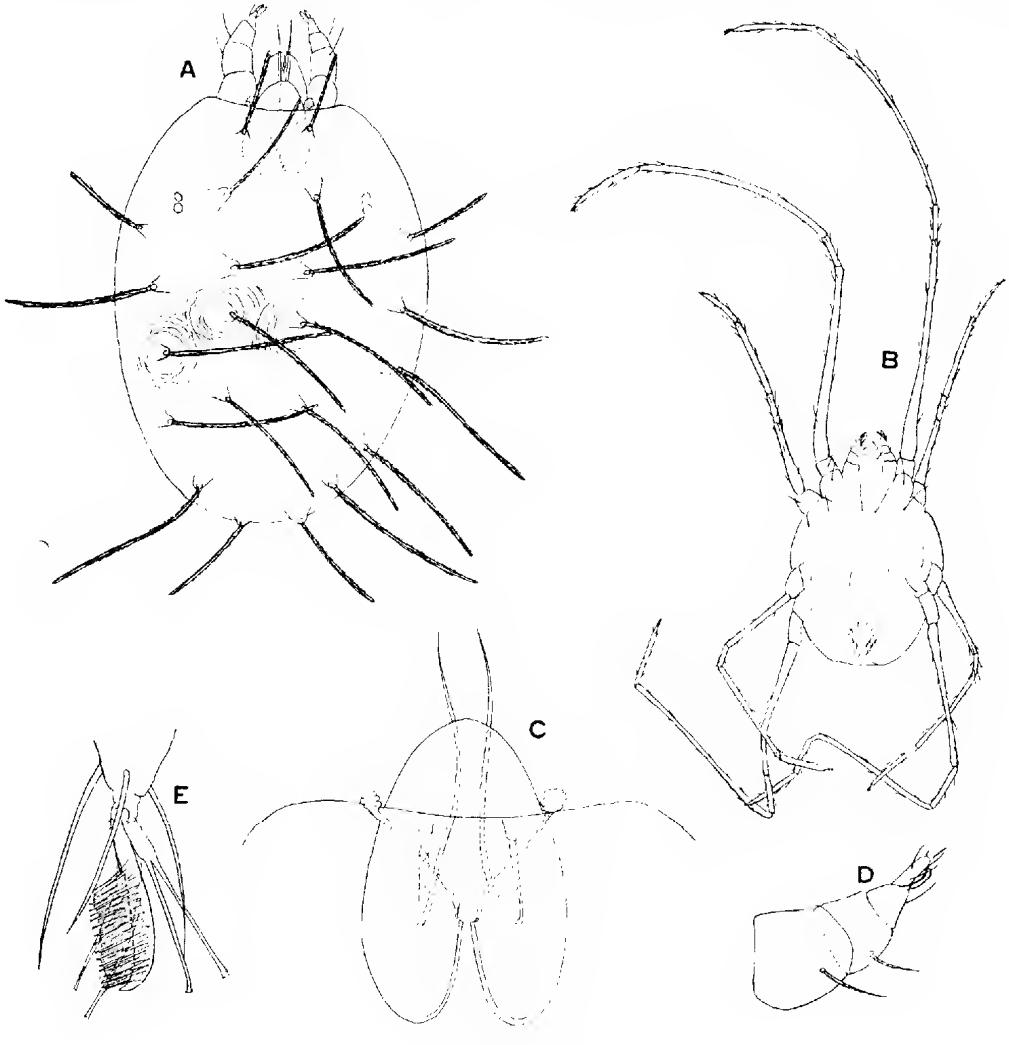

Fig. 8
Tenuicrus errabundus g., et sp. n.
A, dorsal view without legs; B, ventral view; C, mandibles and peritreme; D, palp; E, claws and empodium

papillae. Mandibles styliform with distinct mandibular plate. Peritreme straight, opening externally on each side of mandibular plate in a small compound globular process. Palpi stout with distinct tibial claw. Legs very long and slender,

II and III about half as long again as body, I and IV three to four times as long; tarsi much shorter than tibiae; claws modified to pads furnished with two tenent hairs; empodium claw-like with two series of tenent hairs.

Tenuicrus errabundus n. sp.

Description—Female, length 513 μ, width 350 μ. Colour in life, ? Dorsum irregularly striated, the striae forming circles around the papillae. Dorsal setae long, 190 μ, stout, blunt-ended and ciliated, arising from strong papillae, arranged 2 . 4 . 4 . 4 . 4 . 4. Mandibles styliform, with distinct mandibular plate which is entire at apex; palpi stout, 4-segmented with strong apical claw, tarsus cylindrical, over-reaching tip of claw. Ventral setae long and fine, one on each coxa, a pair between coxae II and between coxae IV and a few small ones around anus. Legs very long and slender, all exceeding body length, I and IV three to four times; tarsi very much shorter than tibiae, claws modified to form pads ending in two tenent hairs, empodium claw-like with two series of tenent hairs. Eyes, two on each side.

Remarks:

This very striking animal resembles the species of *Neophyllobius* in the very long legs, but differs in the dorsal setae and generically in the structure of the tarsal claws and empodial appendage.

Locality:

A single specimen from ground at Concord West, New South Wales, 27 March 1935 (S. L. A.).

Genus **Schizonobia** nov.

Description—Roundish species, dorsally strongly convex with strong dorsal setae arising from papillae. Mandibles styliform with distinct mandibular plate. Palpi stout with strong tibial claw. Peritreme almost straight but ending externally in a very large globular chamber. Legs not excessively long, tarsi about two-thirds length of tibiae, claws modified as two pads ending in paired tenent hairs, empodium claw-like but only with one pair of lateral tenent hairs.

Schizonobia sycophanta n. sp.

Description—Female, colour in life reddish. Length of female 870 μ, width 610 μ. Body strongly convex and roundish, dorsum furnished with very strong ciliated and pointed setae, 148 μ long, arranged 2 . 4 . 4 (6) . 4 . 4 . 4 in transverse rows. Mandibles styliform, mandibular plate distinct, slightly incised at apex. Peritreme short, but ending externally as a large globular chamber. Palpi stout, as figured, with strong tibial spur, tarsus stout, cylindrical, over-reaching tibial claw. Legs not or only slightly longer than body, tarsi about two-thirds length of tibiae; claws modified as pads ending in two tenent hairs, empodium claw-like, with a lateral tenent hair on each side. Ventral setae: long and fine, 81 μ, except the shorter ones around anus, coxae I and II with three subapical

setae, the outer one indistinctly ciliated. III and IV with only one simple seta, gnathosoma with one pair, between coxae I one pair, between III one pair, IV one pair, around anus six pairs.

Locality and Host:

Attacking couch grass, Hobart, Tasmania, 1939 (J. W. E.). The eggs were thickly congregated around the stems.

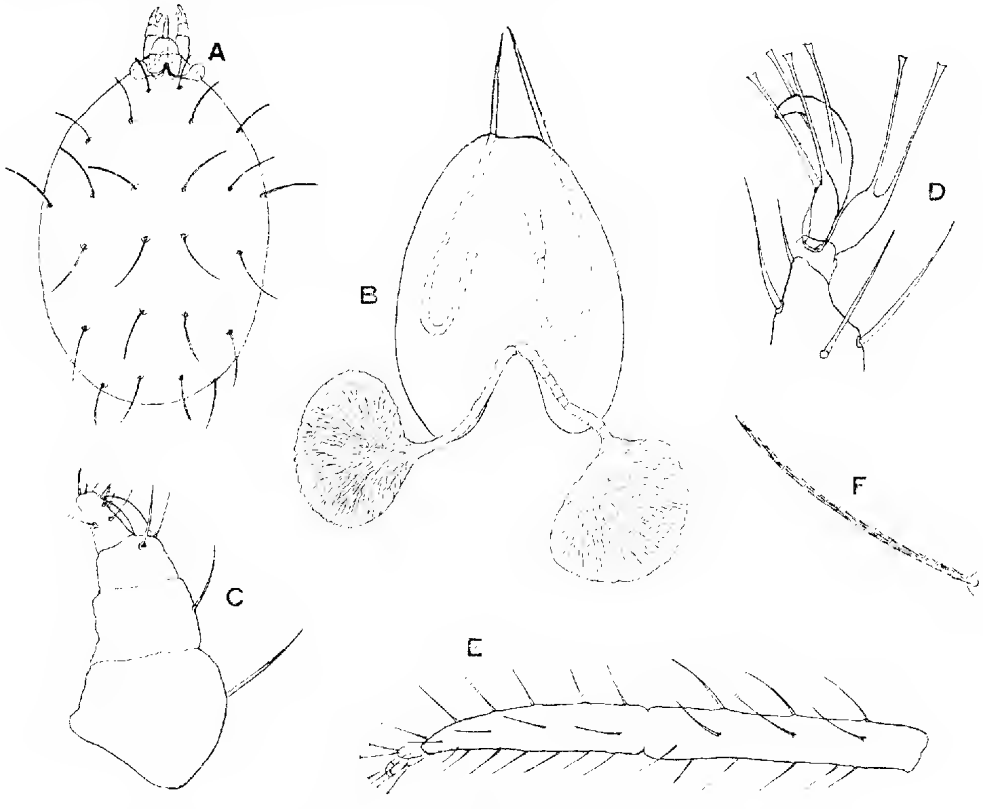

Fig. 9

Schizonobia sycophanta g., et. sp. n.

A, dorsal view without legs; B, mandibles and peritreme; C, palp; D, claws and empodium; E, tibia and tarsus of leg I; F, dorsal seta

Genus **Aplonobia** nov.

Description—Rounded, very convex species, dorsum furnished with strong, long, blunt and serrated setae arising from strong papillae, arranged in seven rows: 2 . 4 . 4 (6) . 4 . 4 . 4 . 2, *i.e.*, setae clunales present. Mandibles styliform, mandibular plate present, palpi stout with distinct tibial claw. Peritreme ending externally in a sausage-shaped chamber. Eyes, two on each side. Legs only slightly, if at all, longer than body, except I which is distinctly longer. Claws modified as pads ending in two tenent hairs, empodium claw-like with series of tenent hairs.

Aplonobia oxalis n. sp. (Sour-sob Mite)

Description—Female, colour in life dark reddish. Length 920 μ, width 700 μ; dorsally strongly convex, furnished with seven transverse rows of strong, blunt, slightly curved and serrate setae, 122 μ long and arranged: 2 . 4 . 4 (6) . 4 . 4 . 4 . 2, *i.e.*, setae clunales present, all setae arising from large prominent papillae. Eyes,

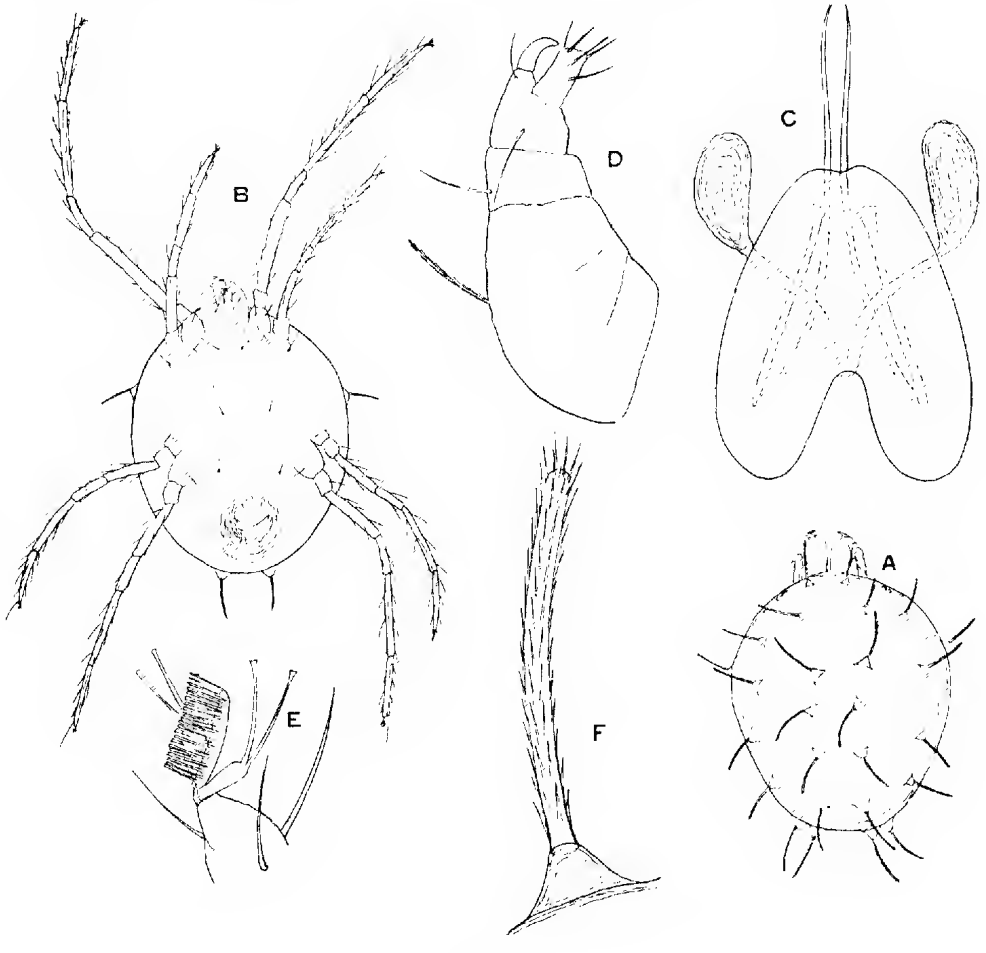

Fig. 10
Aplonobia oxalis g., et sp. n.
A, dorsal view without legs; B, ventral view; C, mandibles and peritreme; D, palp; E, claws and empodium; F, dorsal seta

two on each side, but difficult to discern. Mandibles styliform, mandibular plate slightly incised apically. Palpi stout, tibia with strong claw reaching tip of the shortly cylindrical tarsus. Legs not much if at all longer than body, except I; tarsi only slightly shorter than tibiae, claws pad-like with two tenent hairs, empodium claw-like with series of tenent hairs. Ventrally the setae are long and

fine, gnathosoma with one pair, coxae I and II with two, III and IV with one, a pair between coxae I and coxae IV, and a pair in the field between coxae II and III.

Remarks:

This very interesting species seems to be of some economic importance. In many localities in South Australia it occurs on the Sour-sob *(Oxalis cernua)*, a noxious weed probably introduced to Australia from the Mediterranean Region. Its attack results in the leaves turning yellow and withering. It has also been found affecting fruit trees. The eggs are laid in clusters under bark and twigs lying on the ground. The name of "Sour-sob mite" has been given to this species by agricultural workers in South Australia.

Localities and Hosts:

South Australia: on *Oxalis,* Balaklava, 24 August 1933 (H. W.); on *Oxalis,* Lockleys, September 1933 (D. C. S.); Adelaide, August 1938 (H. W.); Glen Osmond, August 1934 (R. V. S.).

New South Wales: Bathurst, 27 April 1939, on peach (probably only for the purpose of egglaying on the bark).

Genus Petrobia Murray 1877

Petrobia Murray, 1877: Econ. Ent. Apt., p. 118.

Description—Roundish convex animals, dorsum furnished with relatively short, stiff, finely ciliated setae not arising from papillae, arranged in seven transverse rows, *i.e.*, setae clunales present; dorsal suture distinct. Mandibles styliform, mandibular plate present. Peritreme ending externally in a horn- or trumpet-like chamber. Palpi stout, tibial claw present. Claws modified to pads ending in two tenent hairs, empodium claw-like with series of tenent hairs. Legs not longer than body, except I which exceeds body length. Tarsi shorter than tibiae.

Remarks:

Geijskes, in his recent paper, synonymises Banks' genus *Tetranobia* with the above, but a scrutiny of the description of *T. longipes* Banks 1912 shows that the claws are of normal form and, therefore, *Tetranobia* falls into quite a different section of the key to the genera.

Petrobia latens (O. F. Müll. 1776)

Acarus latens Müll., O. F., 1776: Zool. Dan. Prodr., p. 187.
Trombidium lapidum Hammer, 1804: in Hermann, Mem., p. 49.
Petrobia lapidum Murray, 1877: Econ. Ent. Apt., p. 118.
Petrobia lapidum Oudemans, 1915: Arch. für Naturg., **81** (5), p. 49.
Petrobia latens Oudemans, 1939: Krit. Hist. d. Acarol., II, 1759-1804, p. 285.

Oudemans, in his monumental work, has critically reviewed the synonymy of this species, which should now stand under the above name.

Description—Female; colour in life, dark reddish. Dorsum convex, furnished with short stiff ciliated setae of 54 μ length; body 520 μ long, 300 μ wide. The dorsal setae are arranged in seven transverse rows of 2 . 4 . 4 (6) . 4 . 4 . 4 . 2, *i.e.*, setae clunales present. Mandibles styliform, mandibular plate slightly incised at apex. Peritreme ending externally in a horn- or trumpet-like chamber. Palpi stout with strong tibial claw. Eyes, two on each side. Legs II and III shorter than body, IV as long as, I longer than body; tarsi about two-thirds length of

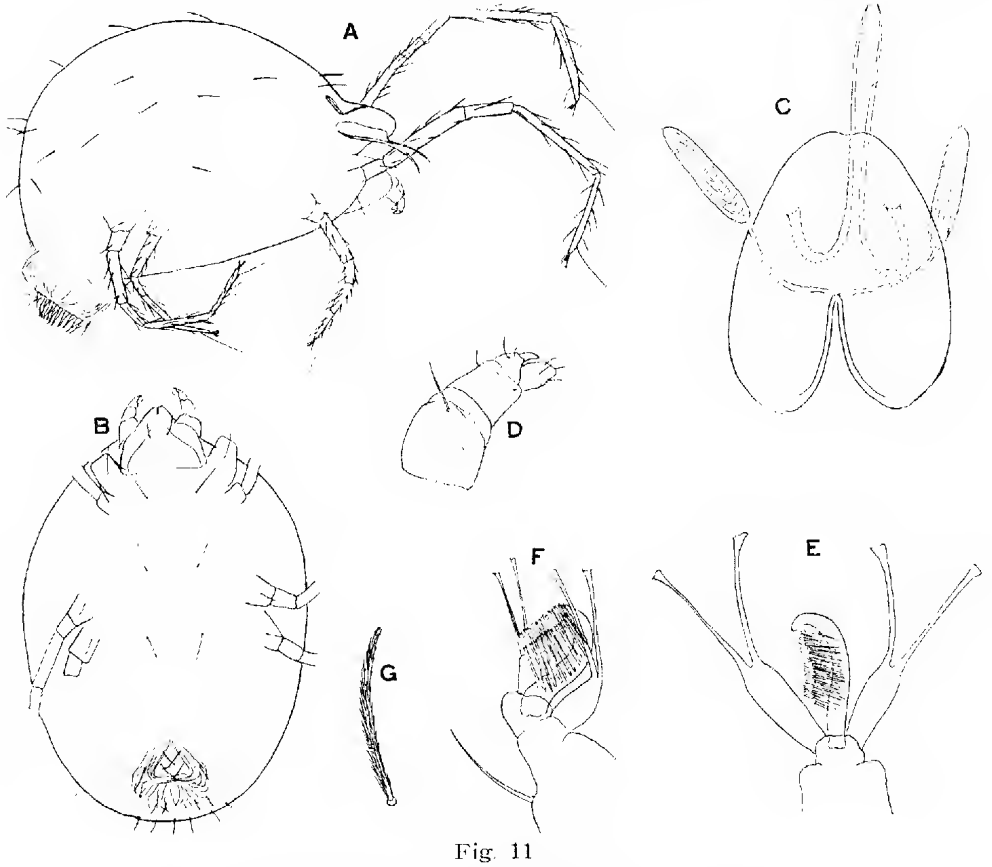

Fig. 11
Petrobia latens (O. F. Müll.)
A, lateral view; B, venter; C, mandibles and peritreme; D, palp; E, claws and empodium; F, same, another view; G, dorsal seta

tibiae; claw modified to pads ending in two tenent hairs, empodium claw-like with series of tenent hairs. Ventral setae: on gnathosoma a pair, on all coxae one, between coxae I, coxae IV and in field between coxae II and III a pair, some smaller ones around the anal and genital openings.

Remarks:

This species is well known in Europe and is undoubtedly an introduction to Australia, where it is of economic importance.

Localities and Hosts:

New South Wales: on wheat, Inverell, 10 October 1929.

Western Australia: on apples along with *Bryobia*, Narrogin, 20 October 1938 (K. R. N.).

Genus TETRANYCHUS Dufour 1832

Tetranychus Dufour, 1832: Ann. Sci. Nat., 25, pp. 276-283.
Epitetranychus Zacher, 1916: Mitt. Kais. Biol. Anst. f. Land- und Forstwirthsch., H. 16, p. 22.
Tetranychus Oudemans, 1931: Ent. Berl., Dl. 8, No. 178, pp. 221-222.

This genus, in its strict sense, includes the true "red-spiders" or "spinning mites," all of which are of considerable economic importance as plant pests.

Description—Dorsum with only six transverse rows of setae, *i.e.*, setae clunales absent; the setae are long and thin, at most with fine indistinct ciliations. Peritreme simple, bent V-shaped, with several chambers, but not broadened. In the female the dorsal cuticular striations form a rhomboidal figure between the last two transverse rows of dorsal setae. Empodium, except on leg I of male, split into six downwardly and somewhat backwardly directed needles. Penis with an end barb or hook.

Type—Tetranychus lintearius Duff.

TETRANYCHUS URTICAE Koch 1836

Tetranychus urticae Koch, 1836; Deutsch. Crust. Myr. Arachn., F. 1, t. 10.
Tetranychus altheae v. Handstein, 1901: Zeitschr. f. Wissenschaftl. Zool., 70 (1), p. 74.
Tetranychus urticae Oudemans, 1930: Ent. Berl., Dl. 8, No. 176, pp. 163-166.

This species is the common "red-spider" in Australia, occurring on a wide variety of cultivated plants, in gardens, fields and hot-houses. All the records hitherto published in Australian literature can almost with certainty be referred here, for examination of recent material has failed to show the presence of any other species.

The true *telarius* Linn. is now transferred to the genus *Eotetranychus*, of which neither that nor any other species can be authoritatively claimed as yet having been found in Australia.

Description—In life greenish, with lateral dark spots during the summer, but in the autumn and winter reddish. Legs and setae whitish. Length of female to 600 μ, width 250 μ, male to 400 μ, width 150 μ. Body roundish-oval. Cuticle finely striated. Dorsum with six rows of long fine and finely ciliated setae arranged 2 . 4 . 4 (6) . 4 . 4 . 4, *i.e.*, setae clunales absent. Eyes, two on each side. Mandibles long and styliform, distinct mandibular plate present, slightly incised at apex. Peritreme long and slender, V-shaped, with several chambers. Palpi stout, tibia with strong claw, tarsus short with thick terminal thumb and thinner lateral rod; in male, femora with a stout curved spine. Claws as two pads ending in a pair of tenent hairs, empodium split into six downwardly directed needles, in male on I the needles are short and stumpy. In the male the penis is short,

curved apically and ending in a hollow expanded collar resembling a barb or hook from a lateral view.

Remarks:

The synonymy of this species has been very much confused, and it is only comparatively recently that Oudemans has definitely separated it from the true

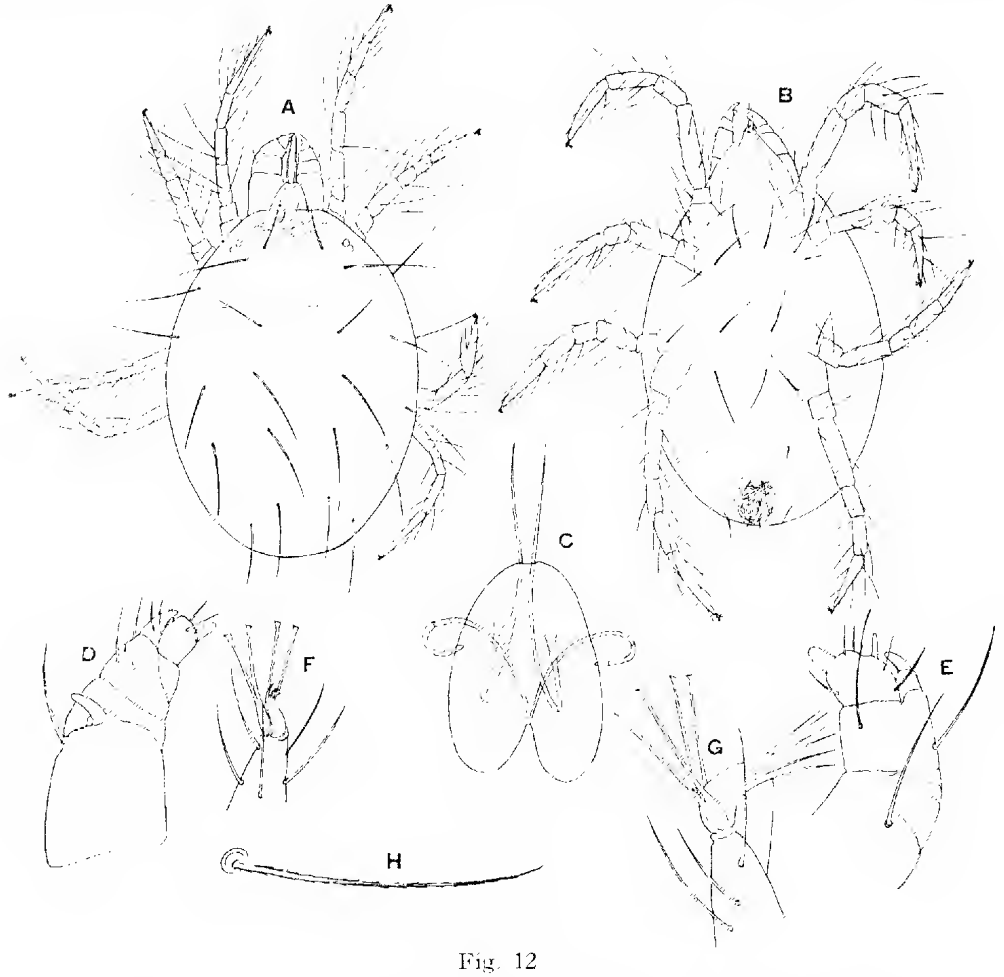

Fig. 12
Tetranychus urticae Koch
A, dorsal view; B, ventral view; C, mandibles and peritreme; D, palp of male; E, palp of female; F, claws and empodium of leg I of male; G, same of female, all legs; H, dorsal seta

telarius as *altheae*, and still more recently synonymised the latter name with *urticae* Koch.

In examining Australian material from time to time, I have referred that from certain localities to *E. carpini* Oudemans. Further study shows this determination to be in error, all the specimens being referable to *T. urticae*.

Localities and Hosts:

South Australia: on sunflowers, Waite Institute, Glen Osmond, 16 February 1934 (D. C. S.); on melons, Hectorville, 27 February 1933; on beans, Murray Bridge, 26 February 1938, Fullarton, March 1940; on hollyhocks, Adelaide, 1939 (H. W.); on lilies, Glen Osmond, September 1935 (R. V. S.).

Queensland: on dahlia, Nambour, March 1936; on cornflower, Brisbane, August 1939; on *Cupressus*, Brisbane, February 1940 (A. R. B.); on strawberries, Nambour, 21 September 1938.

Western Australia: on marigolds, Claremont, 8 May 1935 (L. J. N.); on beans, Perth, 1 November 1931 (B. A. O'C.); on Cape gooseberry, Perth, 17 May 1931; on convolvulus, Guildford, 15 December 1931 (B. A. O'C.); on tobacco, Manginup, 23 March 1939 (A. J. L.).

Victoria: Kyabram, 25 February 1939.

New South Wales: on beans, Sydney, 18 July 1934; on grape leaves, Sydney, 14 December 1934; on Orchids from quarantine *ex* Java, Sydney, 3 April 1939; on rose leaves, Roseville, 9 July 1934; on dahlia, Concord West, Sydney, 5 April 1939.

Australian Capital Territory: on tobacco, Canberra, 3 April 1939, 23 March 1940; on *Datura*, Canberra, 15 March 1940; on Night-shade, Canberra, 15 March 1940; on beans and mallows, Canberra, 15 March 1940; on peach and lemons, Black Mount, Canberra, 15 March 1940; on oak, Canberra, 29 July 1937.

Genus Paratetranychus (Zacker 1913) Trägärdh 1915

Paratetranychus Zacker, 1913: Mitt. Kais. Biol. Anst. f. Land- und Forstw., H. 14, p. 39 (pars).

Paratetranychus Trägärdh, 1915: Medd., No. 109, Centralanst. f. Försökv. pä jordbruksomr; Ent. avdeln. No. 20, pp. 18-56.

Paratetranychus Oudemans, 1931: Ent. Ber., Dl. 8, No. 178, pp. 222-3, No. 181, p. 291.

Description—Empodium as a simple claw; on the under side basally with a process of fine needles in two series of four and six. Claws modified to pads ending in two tenent hairs. Peritreme straight, apically swollen in a small chamber. Dorsal setae in six transverse rows of 2 . 4 . 4 (6) . 4 . 4 . 4, *i.e.*, setae clunales absent; setae long, not arising from papillae. Eyes, two on each side. Mandibles styliform, mandibular plate distinct. Palpi stout, tibial claw present.

Paratetranychus ununguis Jacobi 1905
(The pine-tree spinning mite)

Tetranychus ununguis Jacobi, 1905: Naturw. Zeitschr. Land- und Forstw., Bd. 3, pp. 239-257.

Paratetranychus ununguis Zacker, 1913: Mitt. Kais. Biol. Anst. f. Land- und Forstw., H. 14, p. 39.

Paratetranychus ununguis Trägärdh, 1915: Medd. No. 109, Centralanst. f. Försökw. pä jordbruksomr. Ent. avdeln, No. 20, pp. 29-32.

Description—Female, body short and broad, with convex dorsum. In life brownish-red to dark green. Length to 350 μ, width to 250 μ. Cuticle finely striated. Eyes red, two on each side. Mandibles styliform, plate distinctly present;

incised at apex. Palpi stout, tibia with strong claw, over-reaching tip of tarsus. Peritreme slender and straight, ending in a small swollen chamber. Dorsal setae in six rows, setae clunales absent. Legs not longer than body, claws pad-like, ending in two tenent hairs; empodium a simple claw, ventrally with a process of four to six needles in two series. Ventrally the setae are: on coxae I and II two, on coxae III and IV one, on gnathosoma one pair, between coxae III, II and IV

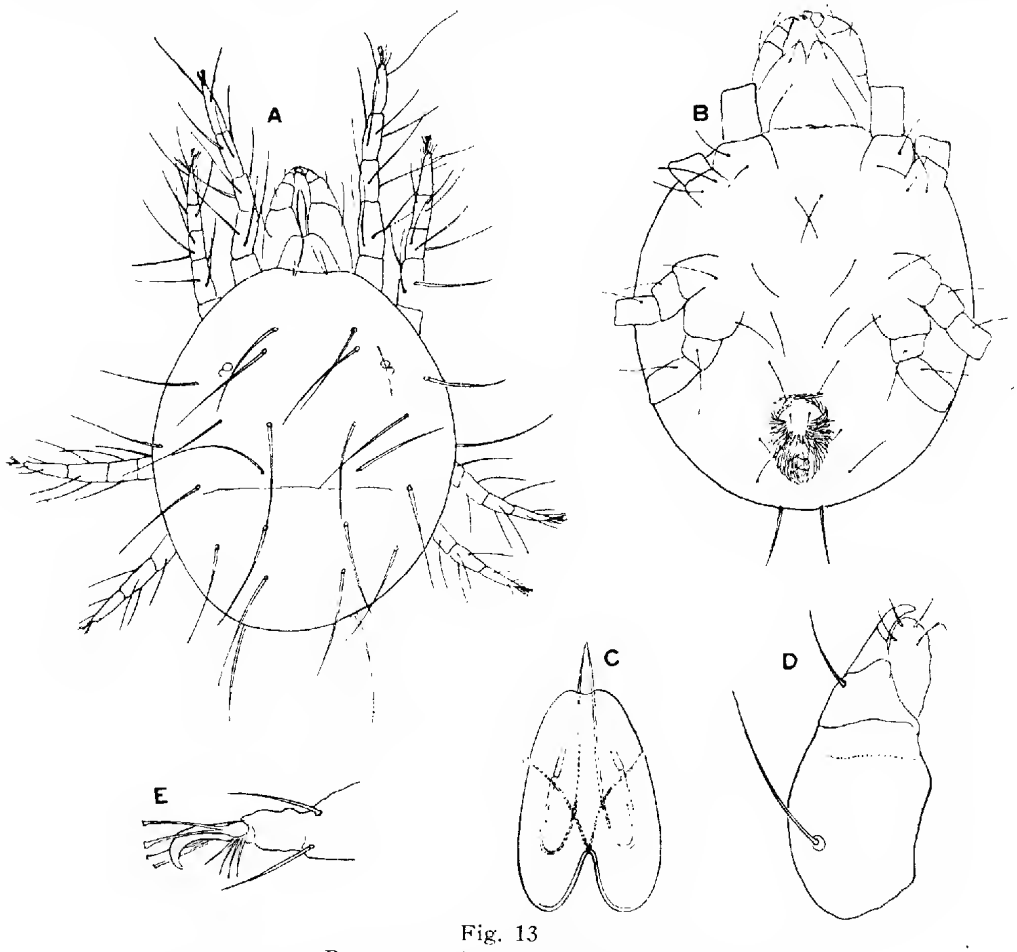

Fig. 13
Paratetranychus ununguis Jacobi
A, dorsal view; B, venter; C, mandibles and peritreme;
D. palp; E, claws and empodium

one pair, in front of genital opening one pair, around genital and anal openings five pairs.

Remarks:

This is a well known species in Europe and, as its popular name implies, is a minor pest of pine trees. It has been found in Australia as follows:

Locality and Host:

Queensland: on *Pinus* sp., Passchendale, near Stanthorpe, 20 May 1938 (A. R. B.).

Genus METATETRANYCHUS Oudemans 1931

Metatetranychus Oudemans 1931: Ent. Ber., viii, No. 177, pp. 198-199; No. 178, p. 224.

Description—Body strongly curved dorsally, dorsal setae in seven transverse rows, *i.e.*, setae clunales present, arising from papillae. Empodium a simple claw with a basal ventral process of four to six needles. Peritreme straight, short, ending in a small swollen chamber.

Type: Metatetranychus ulmi (Koch).

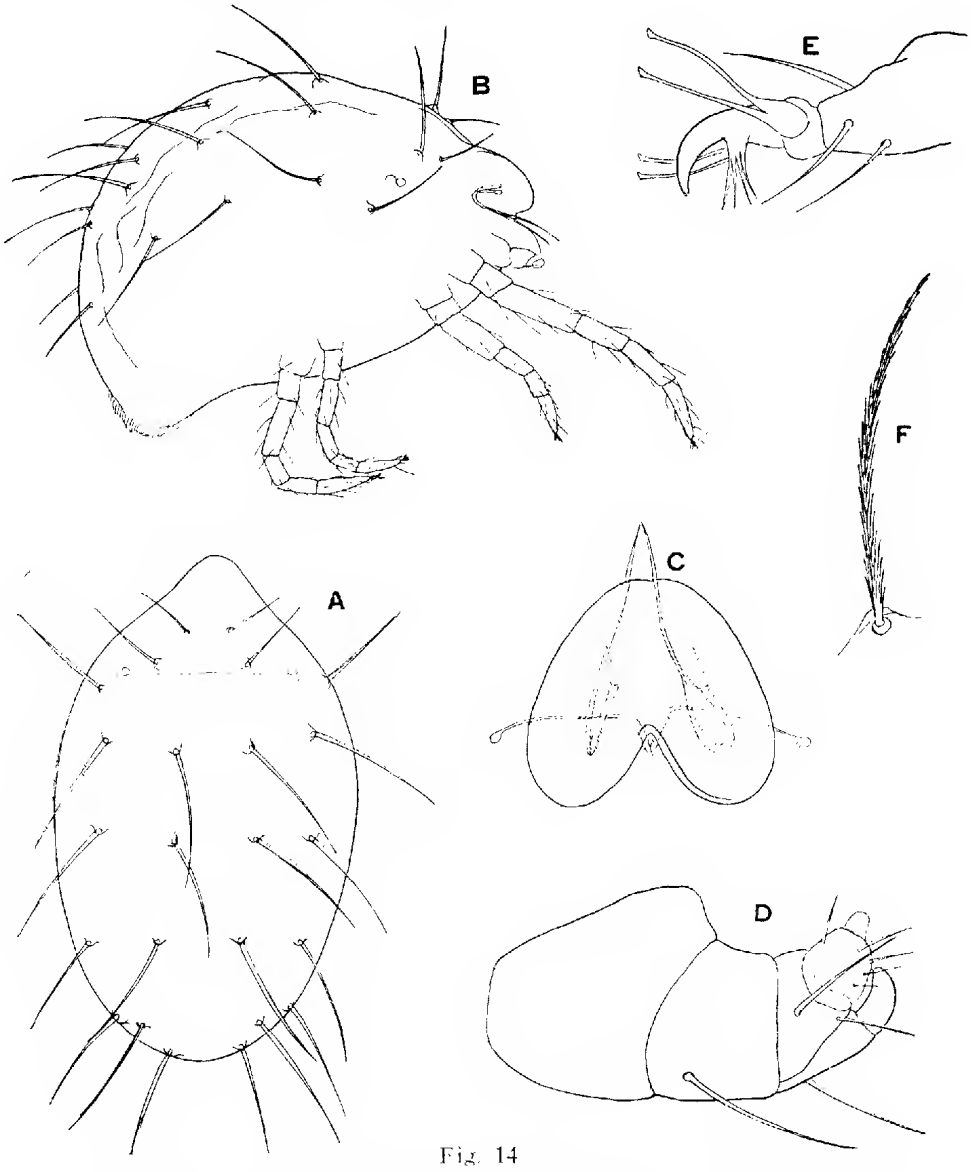

Fig. 14

Metatetranychus ulmi Koch

A, dorsum; B, lateral view; C, mandibles and peritreme; D, palp of female; E, claws and empodium; F, dorsal seta

METATETRANYCHUS ULMI Koch 1836

(The fruit-tree spinning mite)

Tetranychus ulmi Koch, 1836: Deutsche. Crust. Myr. Arachn., H. 1, No. 11.
Tetranychus pilosus Canestr. e Fanzo, 1876 (1): Atti Soc. Ven. Trent., v, pp. 133-134.
Tetranychus mytilaspidis Ewing, 1912: J. Econ. Ent., v, pp. 414-415.
Paratetranychus pilosus Zacker, 1913: Berlin Mitt. Biol. Anst., H. 14, pp. 38-39.
Oligonychus ulmi Hirst, 1920: Proc. Zool. Soc. Lond., pp. 58-59.
Oligonychus alni Oudemans, 1929, male: Ent., Ber., viii, No. 169, p. 19.
Metatetranychus ulmi Oudemans, 1931, female: Ent. Ber., viii, No. 177, pp. 189-199.
Metatetranychus alni Oudemans, 1931, male: Ent. Ber., viii, No. 178, pp. 231-232.

Description—Strongly convex, oval species. In life, dark red. Female, length to 700 μ, width to 350 μ. Dorsal setae thick, pointed, and strongly ciliated, arising from papillae and arranged in seven transverse rows: 2 . 4 . 4 (6) . 4 . 4 . 4 . 2, *i.e.*, setae clunales present. Mandibles styliform, mandibular plate present, indistinctly incised at apex. Palpi stout, tibial claw strong, not reaching tip of tarsus, tarsus with apical thumb that is slightly longer than broad. Peritreme short, straight, ending in small swollen chamber. Legs not longer than body; claws pad-like with two tenent hairs, empodium a simple claw with basal ventral process split into four to six needles. Male: length to 500 μ, body more tapering.

Remarks:

This species is well known in Europe and America, affecting many species of fruit trees. The red spherical eggs are laid on the twigs and branches, often imparting a red hue to the trees. In Europe the eggs hibernate, hatching in the spring. It also occurs in New Zealand, but has only comparatively recently been found in Australia.

Locality:

Tasmania: Margate, 11 February 1939 (J. W. E.).

Genus **Anatetranychus** nov.

Description—Allied to *Neotetranychus* Trägärdh 1915, but differing in that the dorsal setae do not arise from papillae and are not so thick, and that the peritreme, while V-shaped, is (?) inversely so, with equally thin arms, and ends apically in a small rounded swelling. It agrees with *Neotetranychus* in that the empodium is a simple claw without ventral process and the claws are pad-like, ending in two tenent hairs. Mandibles styliform, mandibular plate present, rounded at apex. Palpi stout, tibia with strong claw. Eyes, two on each side.

(1) Oudemans' Zool. Anz., 1 Aug. 1939, Bd. 127, Hft. 3/4, p. 78, states that *pilosus* C. & F., 1876, is not *T. pilosus* of Donnadieau, 1875, and for the latter species gives a new name of *Metatetranychus canestrinii*.

Anatetranychus hakea n. sp.

Description—Short, roundish or slightly tapering species, not very convex dorsally. Colour in life, reddish. Dorsal setae fairly thick, pointed and finely ciliated, arranged in seven transverse rows: 2 . 4 . 4 (6) . 4 . 4 . 4 . 2, *i.e,* setae

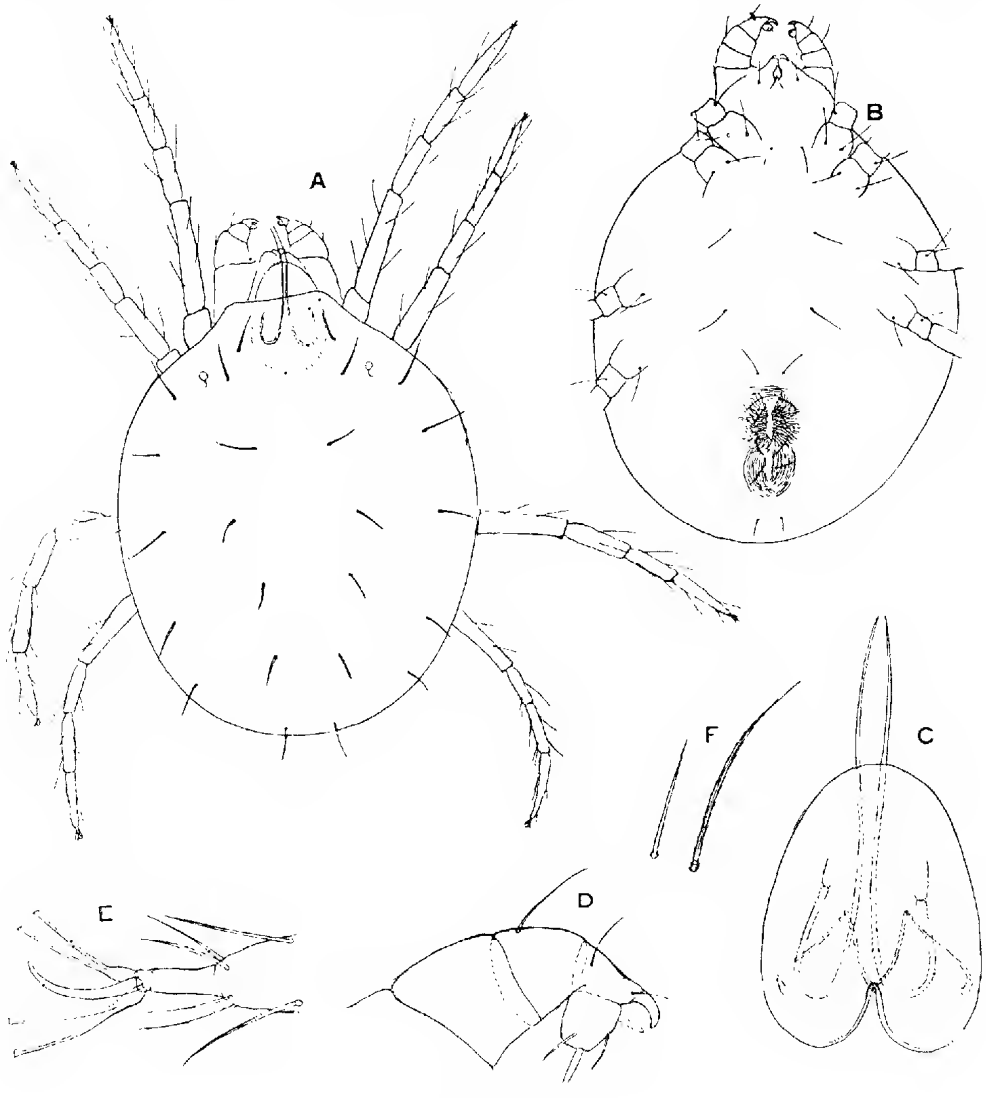

Fig. 15
Anatetranychus hakea g., et sp. nov.
A, dorsal view; B, venter; C, mandibles and peritreme; D, palp; E, claws and empodium; F, dorsal (large) and ventral (small) setae

clunales present. Mandibles styliform, mandibular plate distinct, rounded at apex. Palpi stout, tibia with strong claw, tarsus a little longer than wide, with long terminal rod and another rod basally. Peritreme an inverted V, with equally

thin arms and apically slightly swollen. Eyes, two on each side. Legs barely as long as body, tarsi with a simple claw-like empodium and claws pad-like with long paired tenent hairs. Ventral setae: on coxae I and II two, on coxae III and IV one; on gnathosoma one pair; between coxae I, III and IV one pair; anteriorly and posteriorly of genital and anal opening one pair, and around these openings four pairs. Length, female, 380 μ, width 310 μ.

Locality and Host:

Western Australia: on *Hakea* sp., Claremont, 21 May 1932 (H. W.).

Family TRICHADENIDAE Oudemans 1938

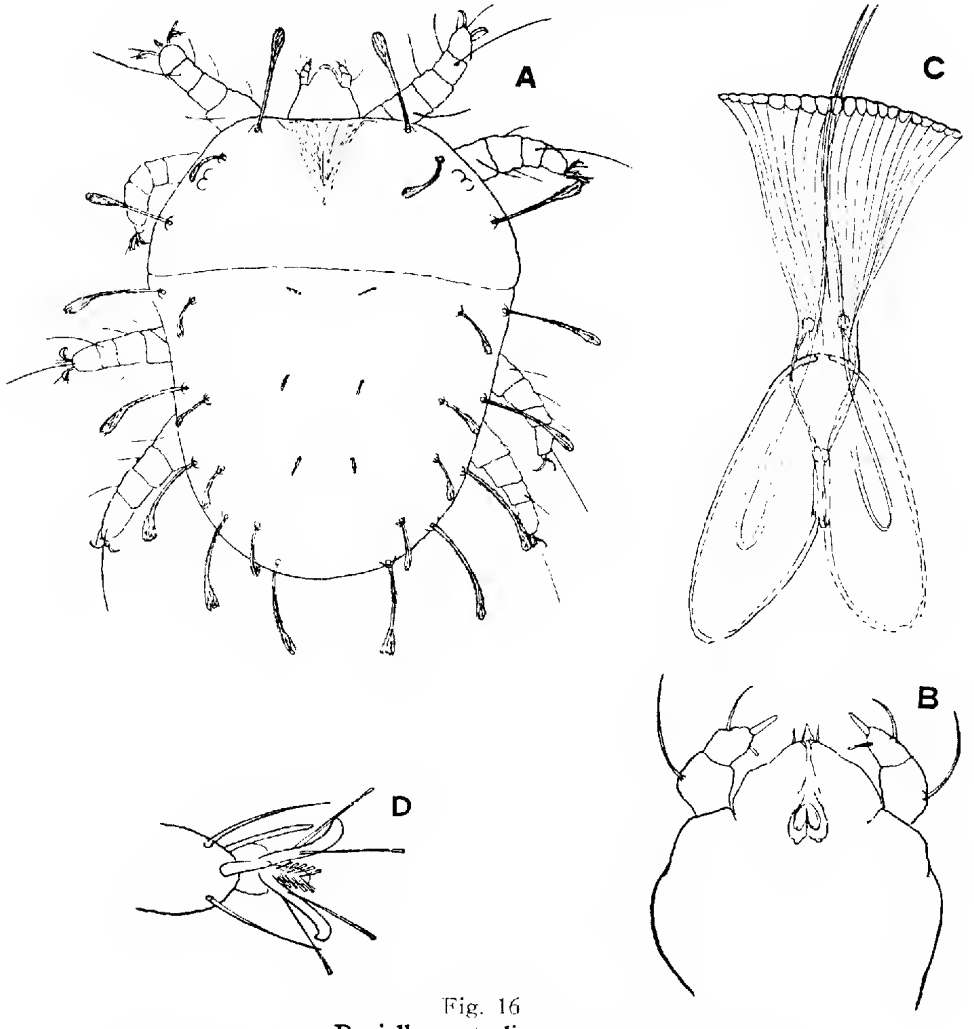

Fig. 16
Raoiella australica n. sp.
A, dorsal view; B, gnathosoma; C, mandibles and peritreme;
D, claws and empodium of leg I

Genus RAOIELLA Hirst 1924

Raoiella Hirst 1924: Ann. & Mag. Nat. Hist., (9) **14**, p. 522, pl. xvi, figs. 1-6.

Description—Round to rectangular species, not excessively convex, with distinct suture. Eyes, two on each side. Mandibles styliform, mandibular plate present. Peritreme complex, as figured. Palpi small, 2-segmented, without tibial claw. Legs short, claws two with paired lateral tenent hairs, empodium with two series of tenent hairs.

Genotype—Raoiella indica Hirst.

Raoiella australica n. sp.

Description—Small, red, roundish to squarish or pentagonal in form, not strongly convex dorsally. Dorsal setae mainly clavate and ciliated, on the propodosoma three pairs around the margin, on hysterosoma quite marginal five pairs equally spaced setae, and just inside margin four pairs of similar but smaller setae, while medially are three pairs of very short non-clavate setae. Mandibles styliform, plate present. Peritreme complex (fig. 16 C). Palpi small, 2-segmented, without tibial claw, apical segment with a terminal rod-like seta, a smaller inner lateral rod and a fine curved pointed seta. Eyes, two on each side. Legs short, tarsi with two claws, each with a pair of lateral tenent hairs, empodium with two series of tenent hairs. Ventral setae not determined. Female—Length 382 μ, width 313 μ.

Remarks:

This is apparently the second species to be described of this interesting genus. It differs from the genotype mainly in the length of the outer dorsal setae and the different nature of the median dorsal setae.

Localities and Hosts:

New South Wales: on eucalypts, Dee Why, 28 July 1932 (A. L. A.).

Queensland: on *Eucalyptus andrewsiana*, Passchendale, 20 May 1938; on *E. tereticornis*, Maryborough, 30 September 1938.

SPECIES INQUIRENDAE

In *Redia*, vol. vi, fasc. 2, 1910, in a List of New Genera and Species of Acarina, Berlese briefly described *Tetranychus pantopus* sp. n. from *Ficus* sp., Moreton Bay, Brisbane (Froggatt) and *Tetranychus histricinus* n. sp. from fruit trees, New South Wales (Froggatt). He therein stated that the species would be described in more detail and figured in his *Manipoli* vii, viii and ix, to be published soon.

The Librarian of the Australian Museum, Mr. Rainbow, has very kindly searched through the later volumes of *Redia* for me, but has been unable to find

any further reference to the figures, nor could he trace them in the indices to vols. i-x and xi-xx of that journal.

It seems certain, therefore, that no further details were ever published by Berlese. The brief descriptions given in vol. vi are too indefinite to recognise the species and they must, therefore, for the present, be regarded as uncertain, especially as Berlese does not appear to have returned any type or other material to the Department of Agriculture at Sydney.

Translations of Berlese's descriptions are as follow:

"Tetranychus pantopus

Female—Triangular, with stout humeri and rather short, thick rough setae; all legs (especially I and II) at least twice as long as body. Length 250 μ, width 220 μ (with legs, from tip of legs I to legs III, 1,000 μ long).

Habitat: on *Ficus* sp., Moreton Bay, Brisbane (Froggatt)."

"Tetranychus histricina

Colour, ?. Resembles *T. horridae,* but not or only slightly excavate dorsally and with dorsal setae much thinner, apically with smooth hairs arising from small tubercles. Length 550 μ, width 360 μ.

Habitat: on fruit trees, Australia, New South Wales (Froggatt)."

N.B.—This latter species does to some extent suggest the species here described as *Aplonobia oxalis.*